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(54) **ADJUSTABLE HEATING DEVICE FOR USE IN AN ERASING APPARATUS**

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(51) **Int. Cl.**

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B41J 2/32	(2006.01)
B41J 2/315	(2006.01)
B41J 29/36	(2006.01)
B41J 3/60	(2006.01)

(52) **U.S. Cl.**

CPC ... ***B41J 29/36*** (2013.01); *B41J 2/32* (2013.01); *B41J 3/60* (2013.01)

(58) **Field of Classification Search**

CPC combination set(s) only.

See application file for complete search history.

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(57) **ABSTRACT**

A heating device includes first and second heating rollers and first and second pressing rollers. The first pressing roller and the second heating roller forms a first unit, and the second pressing roller and the first heating roller forms a second unit that is rotatable about a rotational axis relative to the first unit. The heating device also includes an eccentric shaft unit disposed on one of the first unit and the second unit and extending in a direction parallel to the rotational axis, a rotational position of an eccentric portion of the eccentric shaft unit being changeable, and an engaging unit disposed on the other one of the first unit and the second unit, and configured to engage with the eccentric shaft, a position of the second unit relative to the first unit being adjusted when the rotational position of the eccentric portion of the eccentric shaft unit is changed.

15 Claims, 14 Drawing Sheets

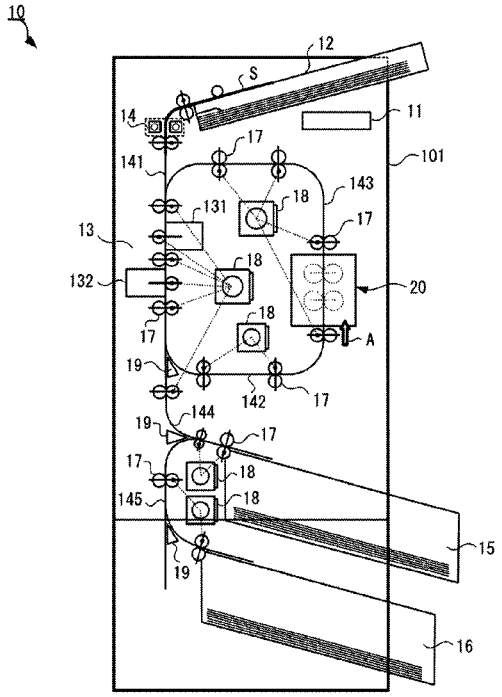
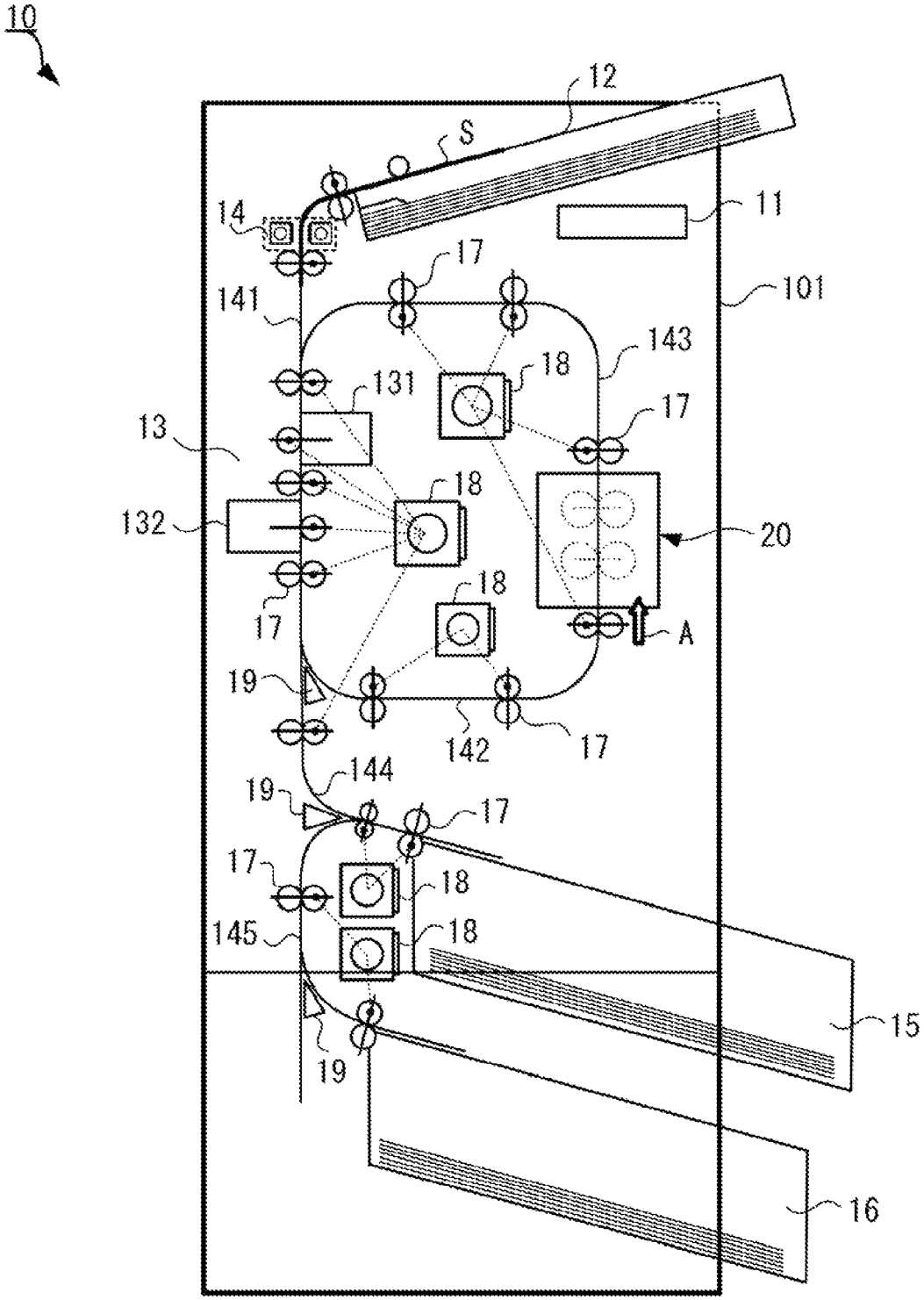


FIG. 1


10
12
S
14
11
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141
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131
13
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132
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142
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144
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145
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16

FIG. 2

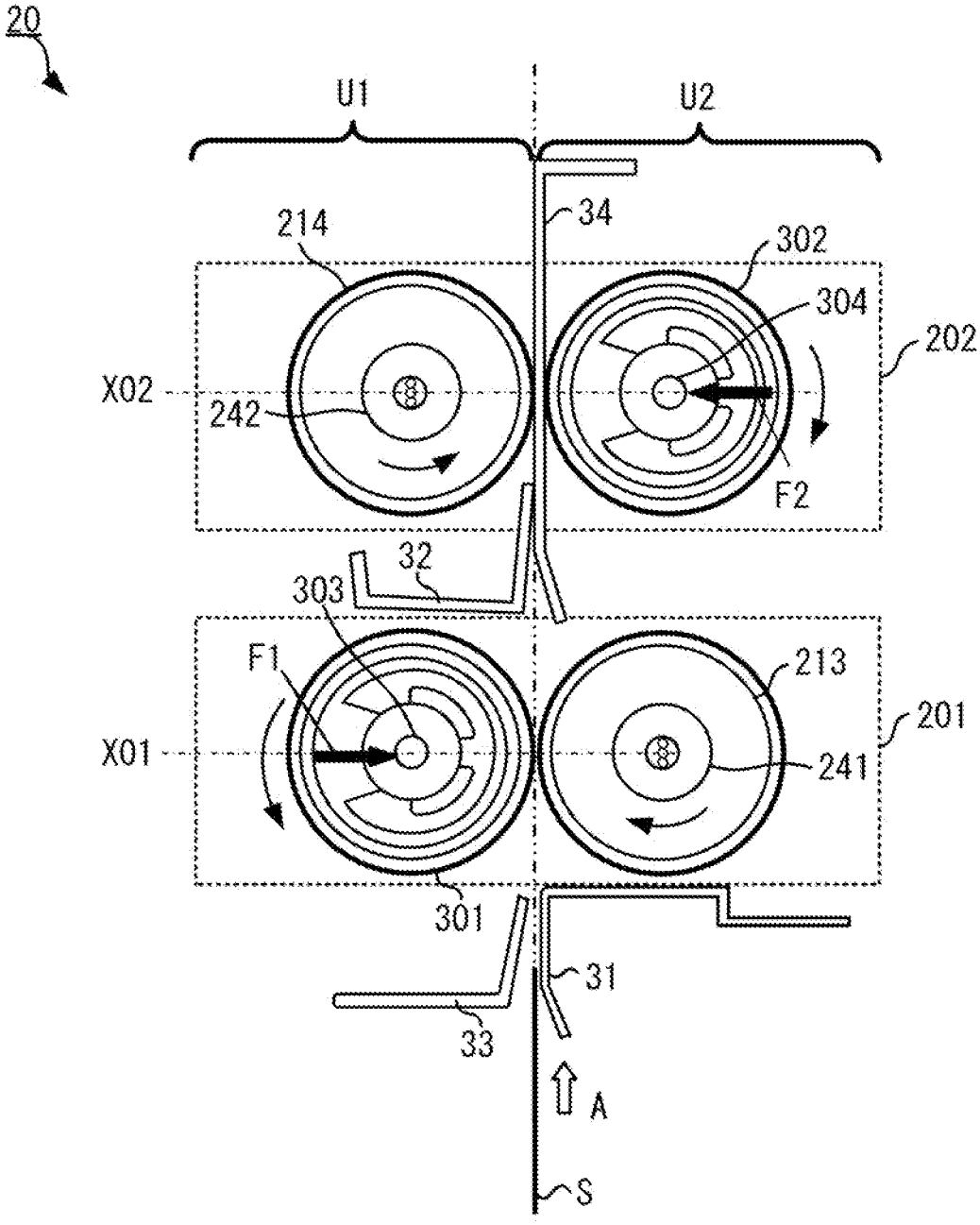

20
U1
U2
34
214
302
304
202
X02
242
F2
32
303
F1
213
201
X01
241
301
31
33
A
S

FIG. 3

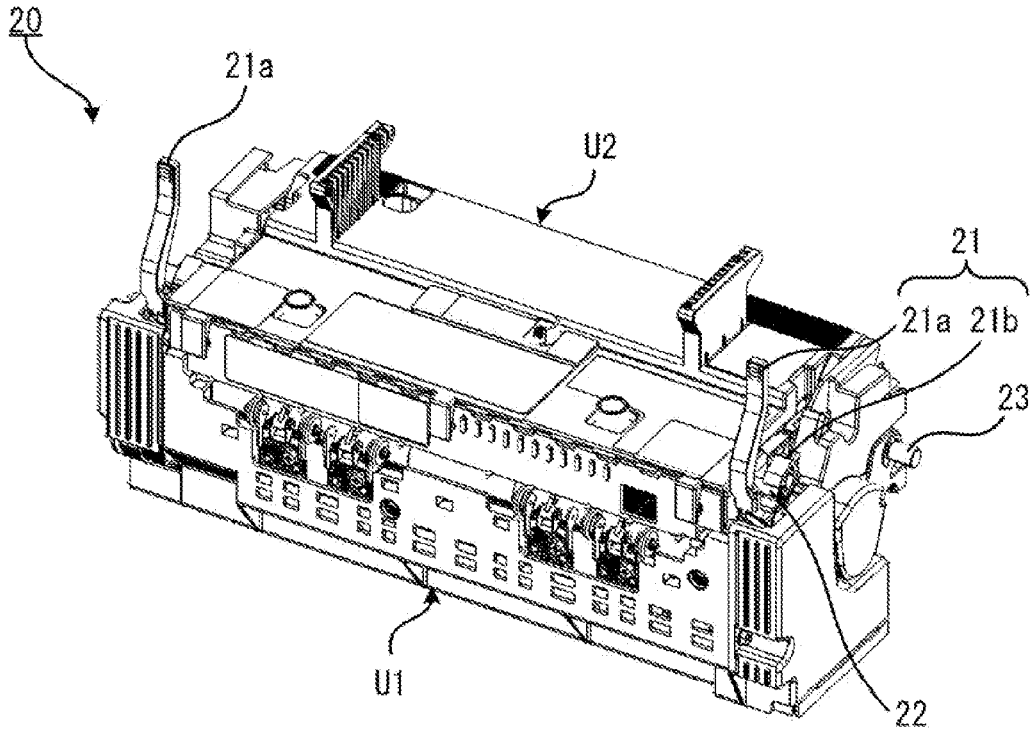


FIG. 4

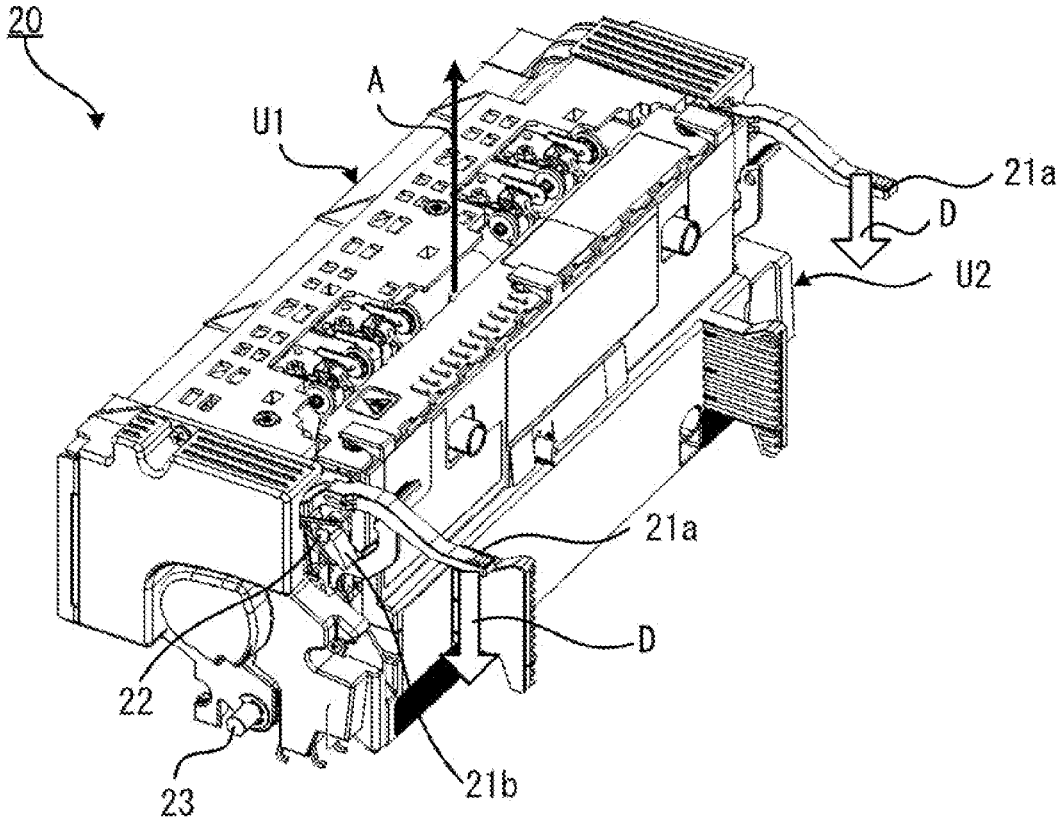


FIG. 5

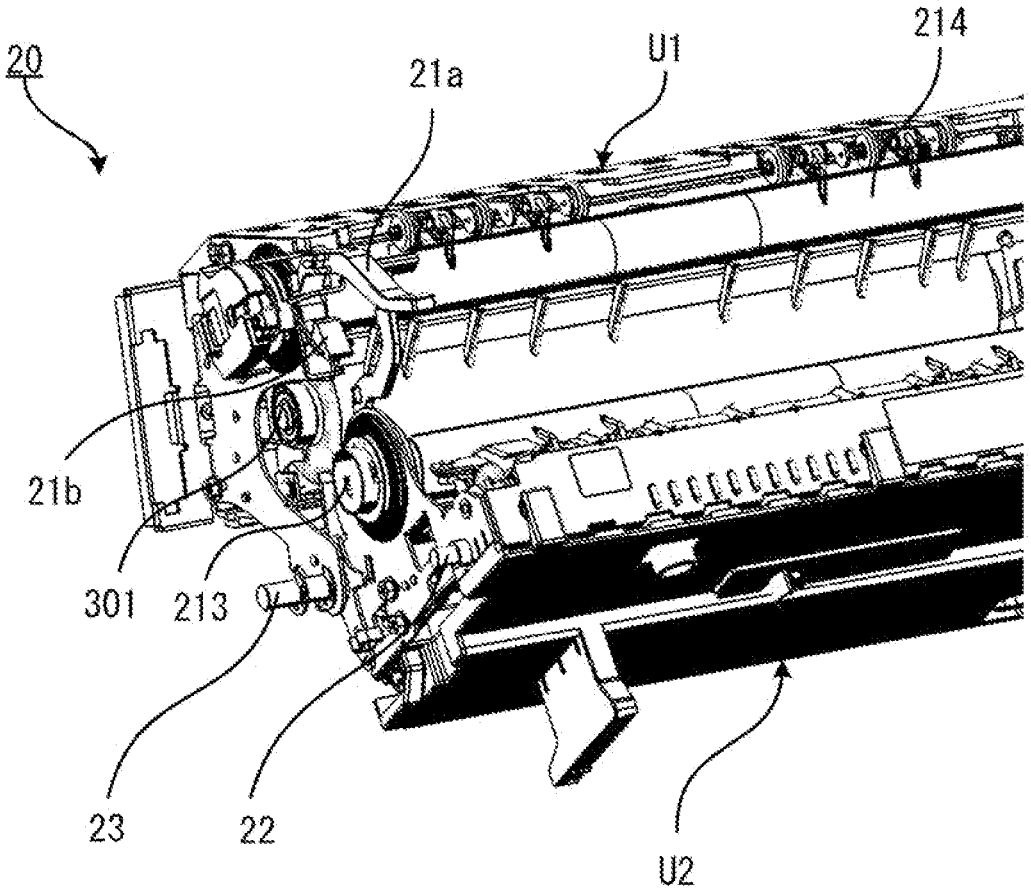


FIG. 6

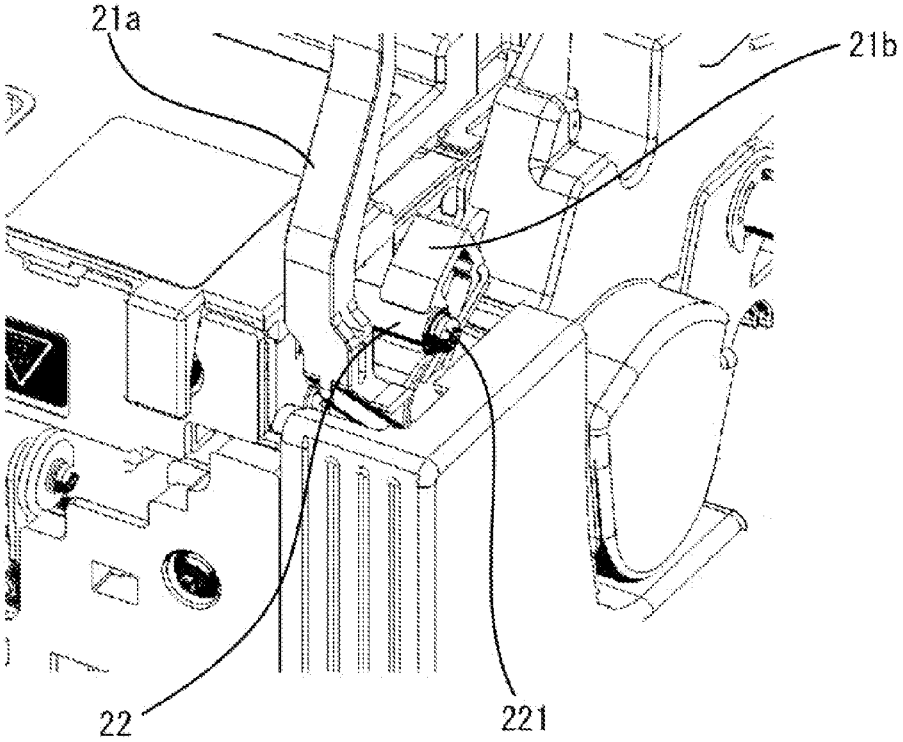


FIG. 7

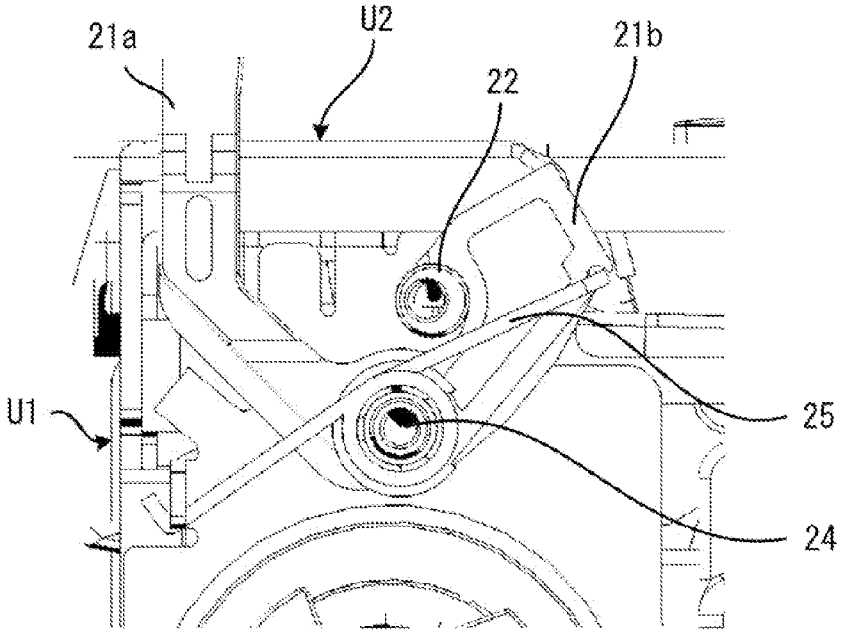


FIG. 8

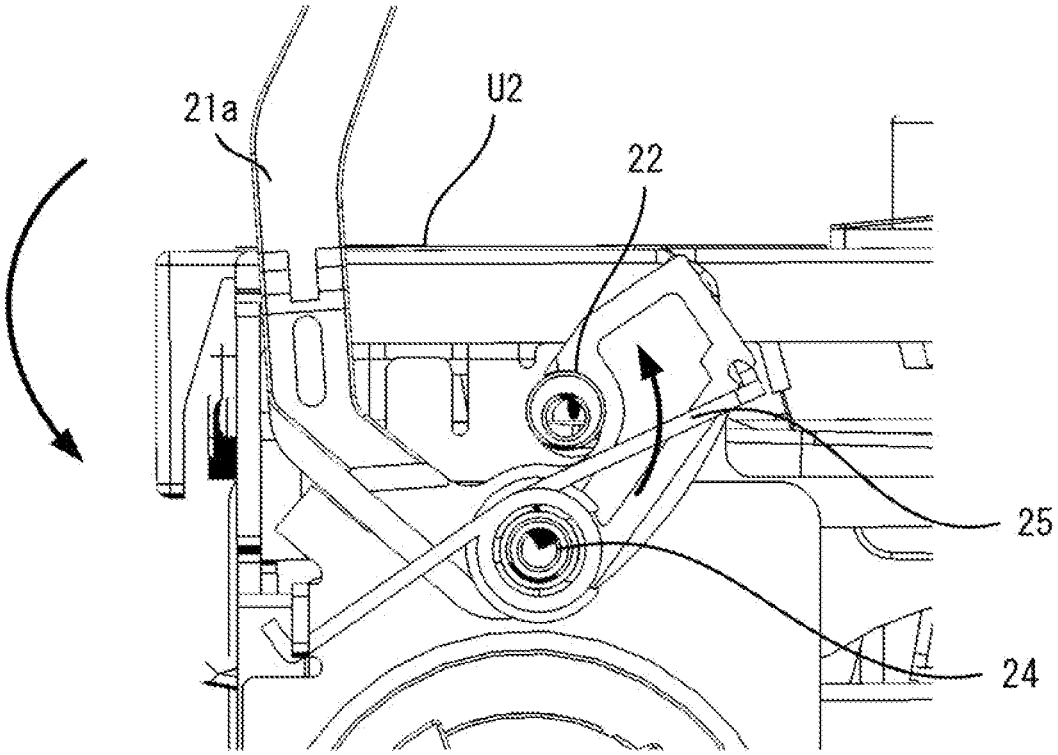


FIG. 9

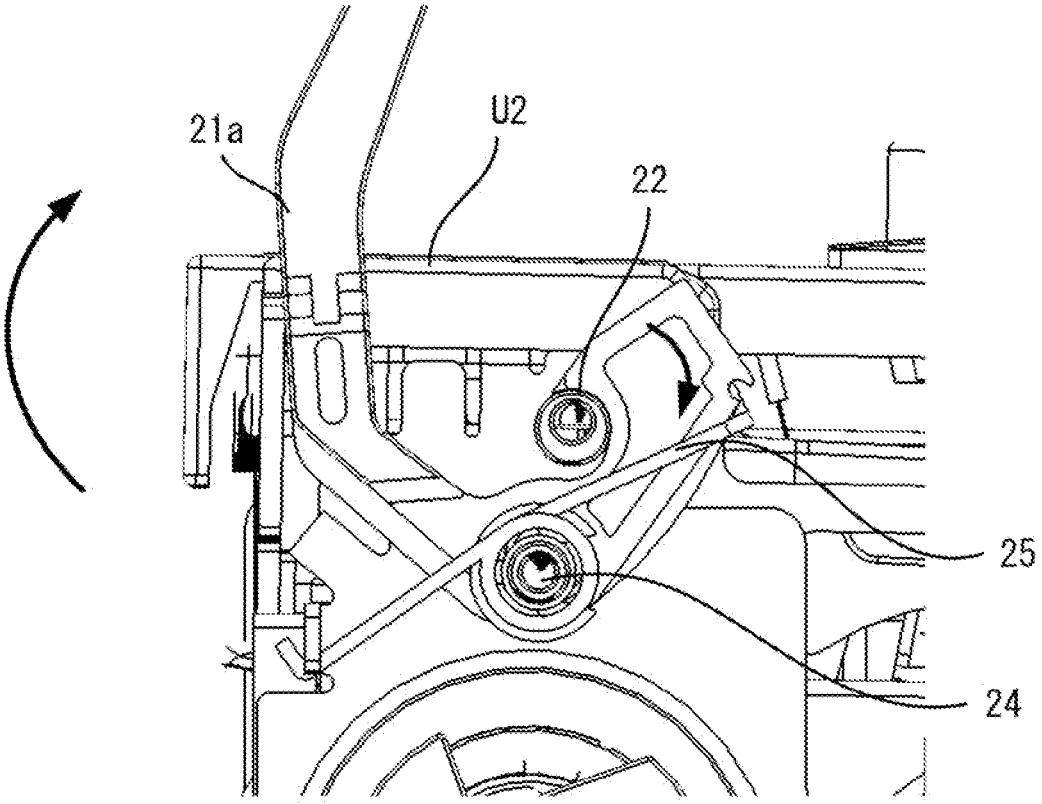


FIG. 10

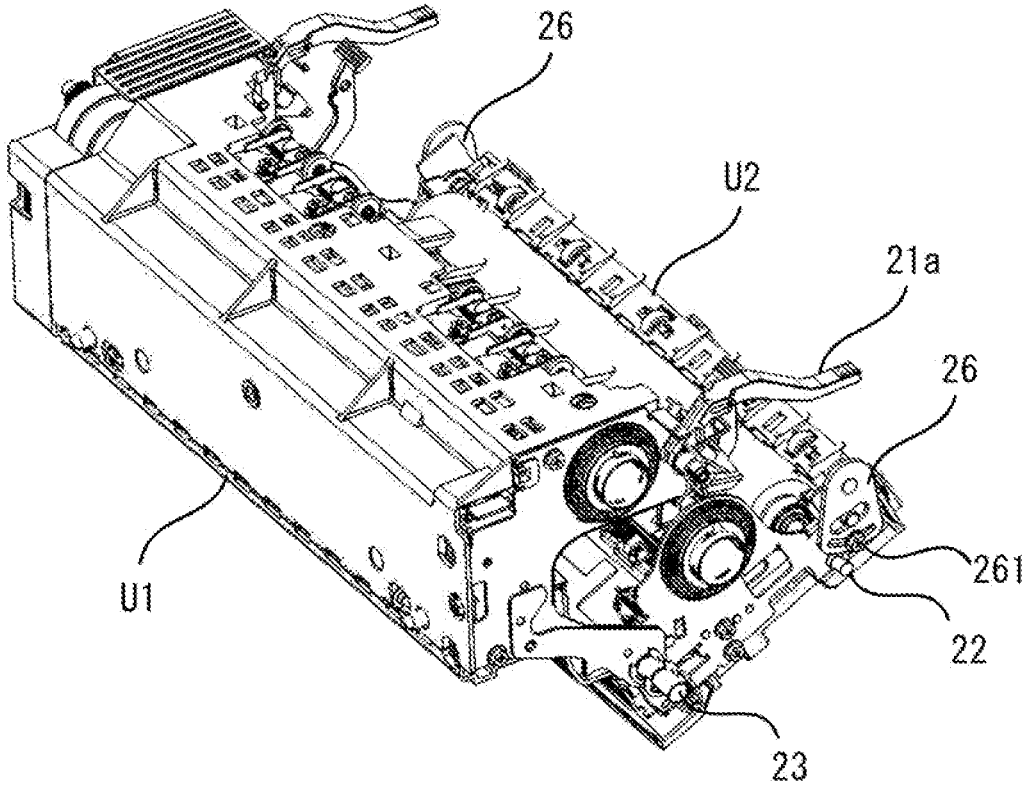


FIG. 11

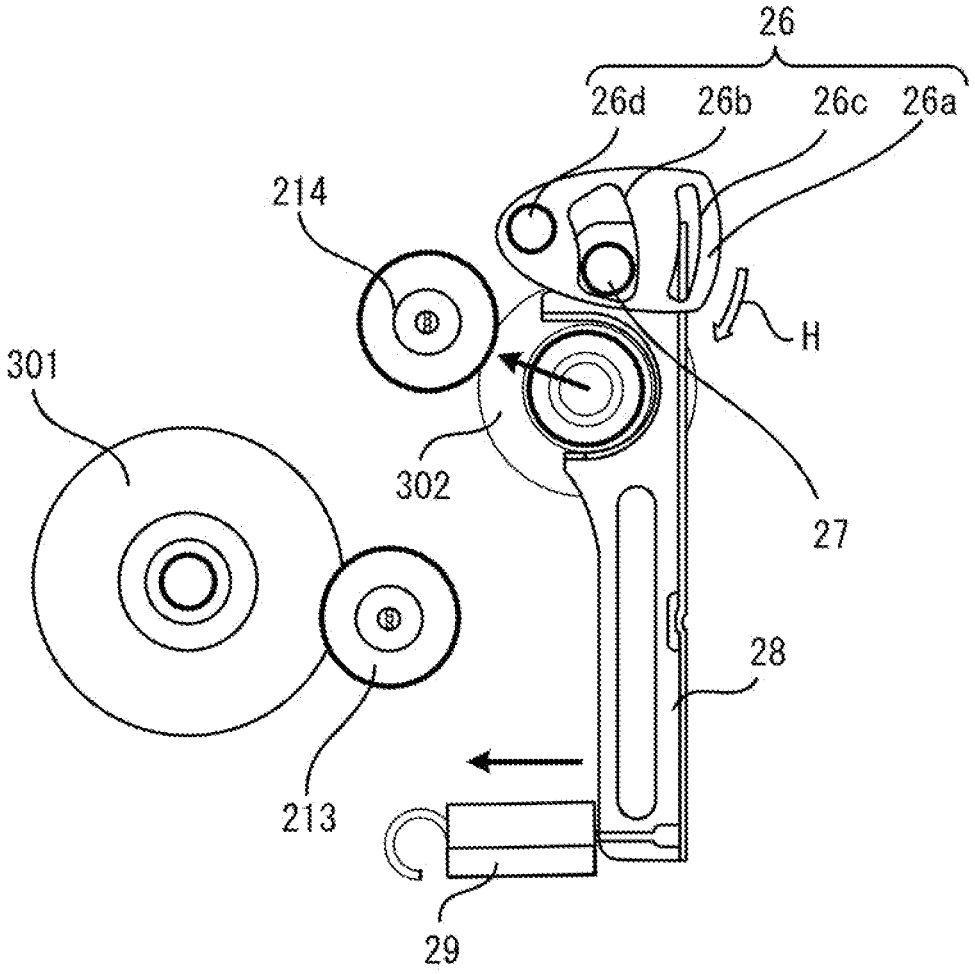


FIG. 12

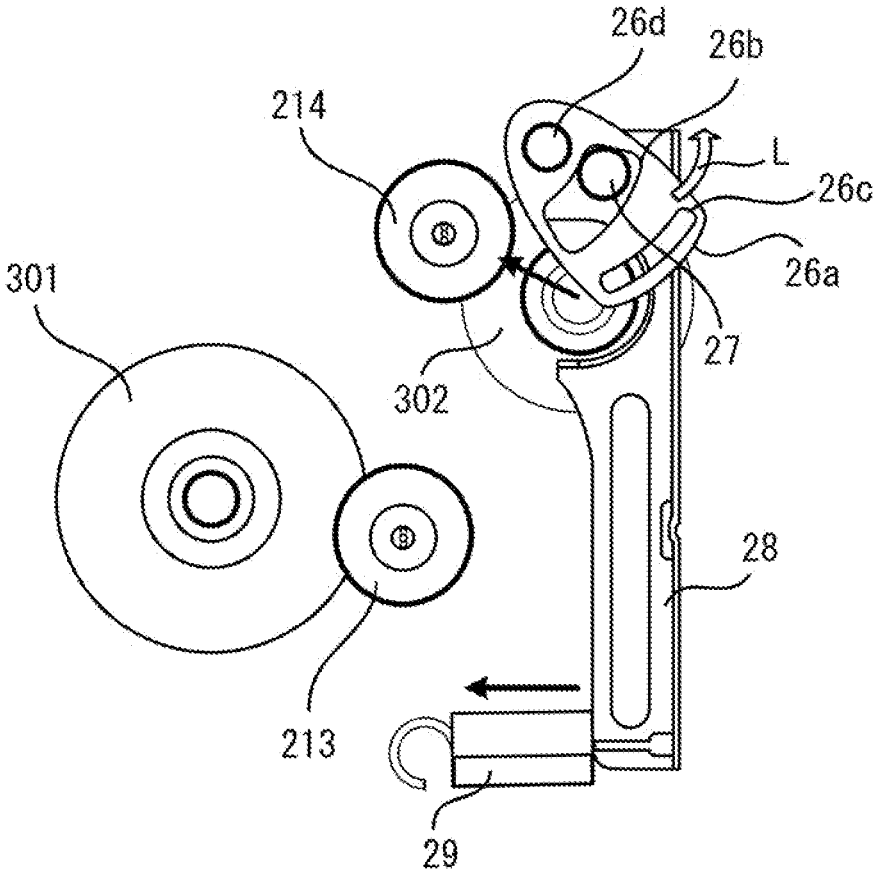


FIG. 13

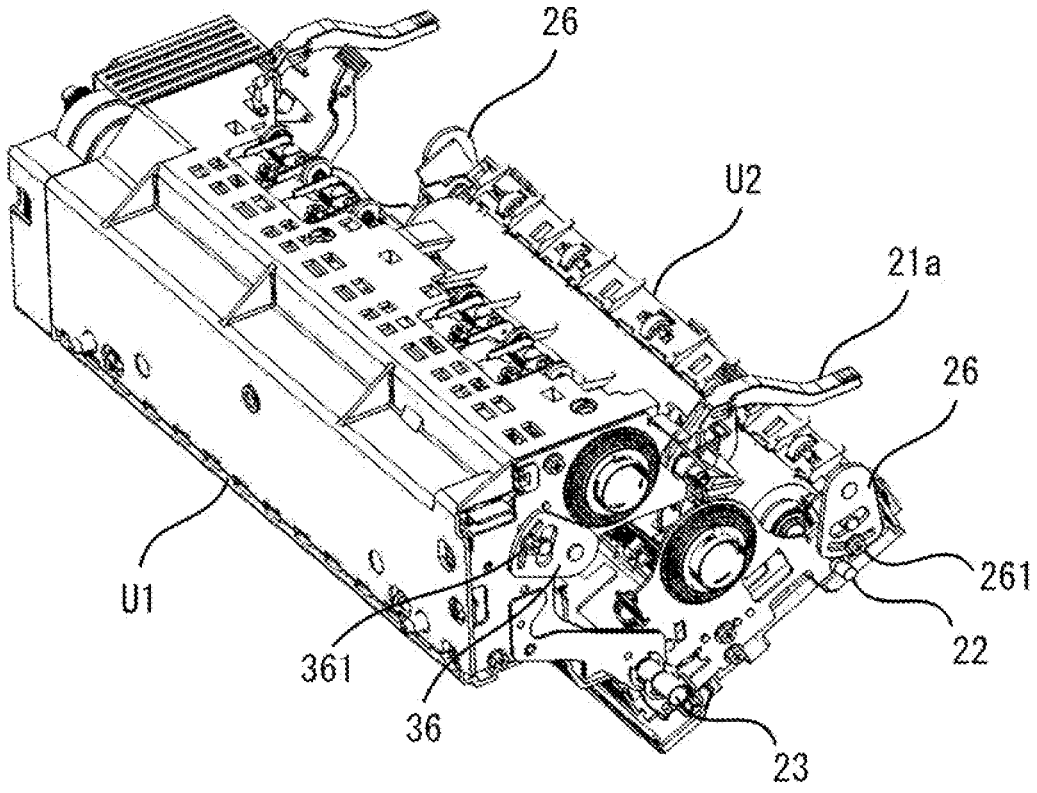


FIG. 14

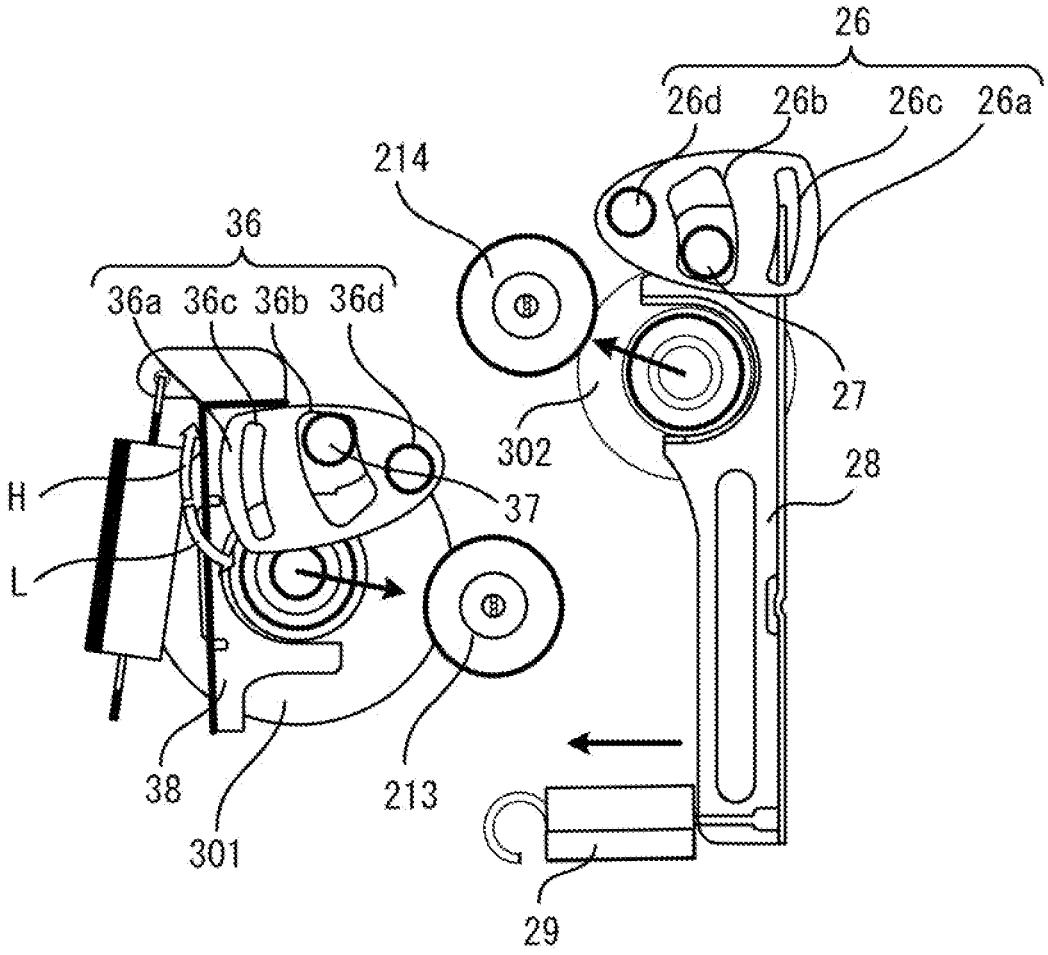
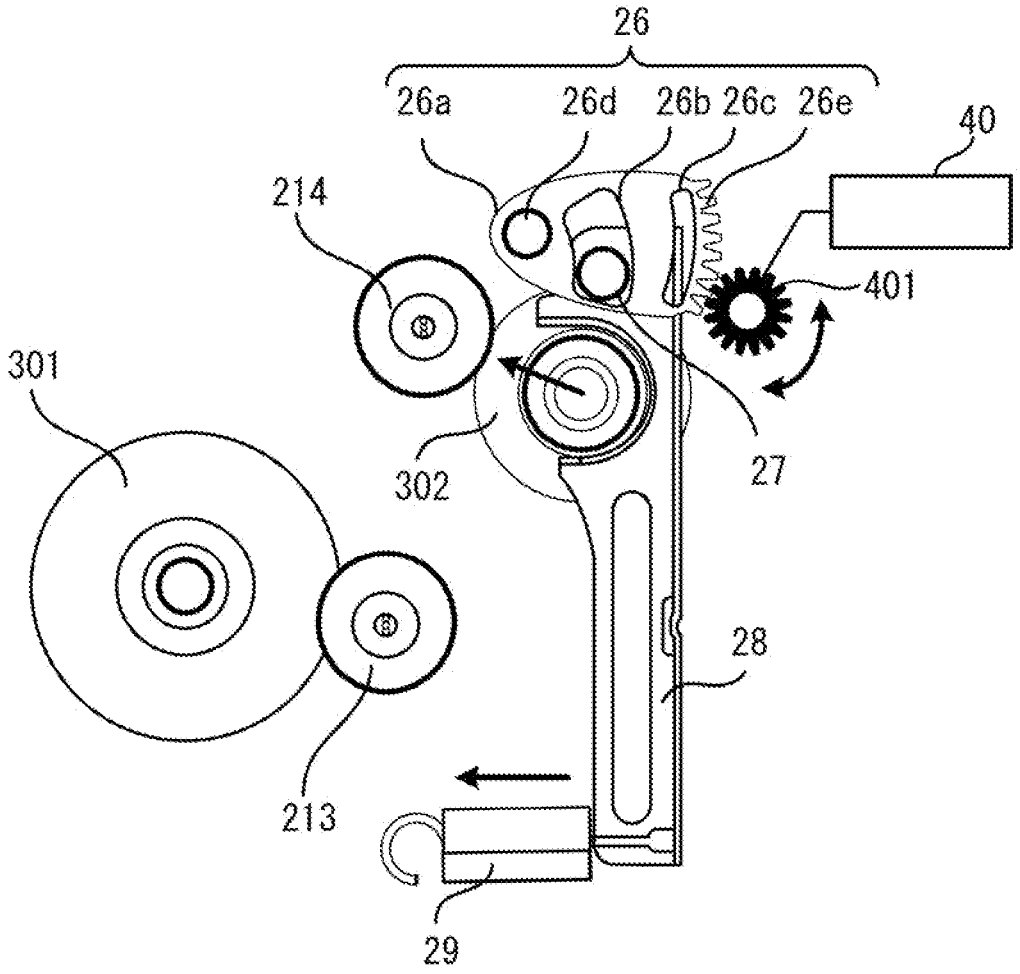

26
26d
26b
26c
26a
214
36
36a
36c
36b
36d
27
302
28
H
37
L
38
213
301
29

FIG. 15



ADJUSTABLE HEATING DEVICE FOR USE IN AN ERASING APPARATUS

FIELD

Embodiments described herein relate generally to a heating device for use with an erasing apparatus.

BACKGROUND

An erasing apparatus performs an erasing processing on a sheet having an image by applying heat and pressure to the image. Such an erasing apparatus employs a heat roll-type heating method, in which a pair of rollers rotates while being heated. By passing through a contact portion of the rollers, the image on the sheet is heated and erased. In the erasing apparatus employing the heat roll-type heating method, a nip area is secured by urging one of the rollers towards the other one of the rollers, and a heat of the roller is transferred to the sheet.

In addition, there are some erasing apparatuses that employ two pairs of heating units, each having a heat roller and a press roller. In such an erasing apparatus, the first heating unit performs an erasing processing on one surface of the sheet and the second heating unit performs an erasing processing on the other surface of the sheet, so that both surfaces of the sheet may be erased during one-time sheet conveyance through the erasing apparatus.

In this type of erasing apparatus, if a sheet jam occurs at any of the heating units, a user pulls out the sheet by opening the erasing apparatus. In order to facilitate clearing of jams, the erasing apparatus employs a heating device opening and closing mechanism that causes the first heating unit and the second heating unit to be opened at the same time using a common rotating shaft as a rotational axis.

However, such a heating device opening and closing mechanism has a drawback in that it is difficult to optimize pressures applied in both of the first and second heating units because the pressure in the first heating unit is associated with the pressure in the second heating unit. In particular, the pressure in the second heating unit, which is disposed far from the rotating shaft, varies depending on sizes of members holding the heat roller or the press roller by a greater amount relative to the first heating unit.

DESCRIPTION OF THE DRAWINGS

FIG. **1** is a schematic view illustrating an entire configuration example of an erasing apparatus to which a heating device according to a first embodiment is applied.

FIG. **2** is a cross-sectional view illustrating a specific example of an inside configuration of the heating device illustrated in FIG. **1**.

FIGS. **3** and **4** are perspective views of the heating device illustrated in FIG. **1** from different viewpoints.

FIG. **5** is a perspective view of the heating device illustrated in FIG. **1** when the heating device is opened.

FIG. **6** is an enlarged perspective view illustrating a connection state of an opening and closing lever and an eccentric shaft in the heating device illustrated in FIG. **1**.

FIG. **7** is a side view illustrating the connection state of the opening and closing lever and the eccentric shaft illustrated in FIG. **6**.

FIGS. **8** and **9** are side views describing a change in the center position of the eccentric shaft in the connection state of the opening and closing lever and the eccentric shaft illustrated in FIG. **7**.

FIG. **10** is a perspective view of a heating device according to a second embodiment when the heating device is opened.

FIGS. **11** and **12** are schematic views describing a nip width adjustment structure of the heating device illustrated in FIG. **10**.

FIG. **13** is a perspective view of a heating device according to a third embodiment that is opened.

FIG. **14** is a schematic view describing a nip width adjustment structure of the heating device illustrated in FIG. **13**.

FIG. **15** is a schematic view describing the nip width adjustment structure of the heating device according to a fourth embodiment.

DETAILED DESCRIPTION

A heating device includes a first heating roller configured to heat a first surface of a sheet, a second heating roller configured to heat a second surface of the sheet, the second heating roller disposed downstream in a sheet conveying direction with respect to the first heating roller, a first pressing roller configured to press the sheet against the first heating roller, the first pressing roller and the second heating roller forming a first unit, a second pressing roller configured to press the sheet against the second heating roller, the second pressing roller and the first heating roller forming a second unit that is rotatable about a rotational axis relative to the first unit, an eccentric shaft unit disposed on one of the first unit and the second unit and extending in a direction parallel to the rotational axis, a rotational position of an eccentric portion of the eccentric shaft unit being changeable, and an engaging unit disposed on the other one of the first unit and the second unit, and configured to engage with the eccentric shaft, a position of the second unit relative to the first unit being adjusted when the rotational position of the eccentric portion of the eccentric shaft unit is changed.

Hereinafter, description will be given with regard to embodiments in detail using drawings.

First Embodiment

As illustrated in FIG. **1**, an erasing apparatus **10** includes an operation panel **11** which includes an operation button and a display unit, a sheet feeding unit **12**, a scanner **13** which is a reading unit, an ultrasonic sensor **14** which detects a conveying state of a sheet S, and a heating device **20** which erases an image on the sheet S. Furthermore, the erasing apparatus **10** includes a first sheet ejecting tray **15** and a second sheet ejecting tray (reject box) **16** which are sheet ejecting units, in addition to a first conveyance path **141**, a second conveyance path **142**, a third conveyance path **143**, a fourth conveyance path **144**, and a fifth conveyance path **145**.

Along conveyance paths **141-145**, a plurality of conveying rollers **17** to convey the sheet S are disposed, and a plurality of motors **18** are disposed to drive respective conveying rollers **17**. In addition, the respective conveyance paths **141-145** are provided with a plurality of gates **19** in order to accurately convey the sheet S to the respective conveyance paths **141-145**.

Along the first conveyance path **141**, the sheet S is conveyed from the sheet feeding unit **12** to the scanner **13**. Along the second conveyance path **142**, the sheet S is conveyed from the scanner **13** to the heating device **20** in a direction indicated by an arrow A. Along the third conveyance path **143**, the sheet S is conveyed from the heating device **20** to the scanner **13** again. Along the fourth conveyance path **144**, the sheet S is conveyed from the scanner **13** to the first sheet ejecting tray

15. Along the fifth conveyance path **145**, the sheet S is conveyed from the scanner **13** to the second sheet ejecting tray (reject box) **16**.

The first sheet ejecting tray **15** stores a sheet S which can be reused, for example, after an image erasing processing. The second sheet ejecting tray (reject box) **16** stores a sheet S which cannot be reused and is recycled with normal disposal.

The erasing apparatus **10** generally performs the following operations (1) to (5).

(1) The sheet S fed from the sheet feeding unit **12** through the first conveyance path **141** is scanned by the scanner **13**. The scanner **13** includes a first scanner **131** and a second scanner **132** and scans both surfaces of the sheet S. The scanner **13** reads out image data, for example, before an image of the sheet S is erased. At the same time, a printing status of the sheet S is determined based on the image data.

(2) Saving or the like of the image data read out by the scanner **13** is performed. If there is a wrinkle or a tear on the sheet S in view of the printing status acquired with the scanner **13**, the sheet S is guided to the fifth conveyance path **145** and is conveyed to the reject box **16**. The sheet S without any wrinkle or tear is conveyed to the heating device **20** through the second conveyance path **142**.

(3) The sheet S conveyed to the heating device **20** is heated when passing through the heating device **20**, an image formed on the sheet S is erased by heat. The heating device **20** erases the image on the sheet S by pressurizing and heating the sheet S, for example, at a relatively high temperature of 180° C. to 200° C. Description with regard to a specific configuration of the heating device **20** will be given below.

(4) The sheet S which has passed through the heating device **20** is conveyed to the scanner **13** again through the third conveyance path **143**. The printing status is determined again based on the image scanned by the scanner **13** in order to confirm whether or not the image formed with a erasable color agent in an image area is surely erased.

(5) The sheet S which can be reused is conveyed to the first sheet ejecting tray **15** through the fourth conveyance path **144**. If an image formed with a non-erasable color agent or an handwritten image remains in the image area, or an wrinkle or a tear occurs in view of the printing status acquired with the scanner **13**, the sheet S is conveyed to the reject box **16** through the fifth conveyance path **145**.

The heating device **20** conveys the sheet S fed by the sheet feeding unit **12** through the conveyance path while heating the sheet S with a heat source having a predetermined temperature and erases the image on the sheet S. As illustrated in FIG. **2**, the heating device **20** includes a heat source in each of a first erasing unit **201** and a second erasing unit **202**. The first erasing unit **201** (first heat source) includes a first heat roller **213**, which is a heating member, and a second press roller **301**, which is a pressing member. In the same manner, the second erasing unit **202** (second heat source) includes a second heat roller **214** and a second press roller **302**. In addition, the first erasing unit **201** and the second erasing unit **202** have substantially the same configurations, but the first erasing unit **201** and the second erasing unit **202** are flipped upside down. The first press roller **301** and the second press roller **302** are rotating rollers which respectively rotate around rotating shafts **303** and **304** and formed in a cylindrical shape which extends in a width direction of the sheet S.

The sheet S is conveyed along the second conveyance path **142** from the direction of the arrow A. The direction of the arrow A corresponds to the direction of the arrow A of FIG. **1**. The first heat roller **213** and the second heat roller **214** respectively have a halogen heater **241** and a halogen heater **242**, which are cylindrical. A sheet guide **31** is disposed at a sheet entering side of the first erasing unit **201**, and a sheet guide **32** is disposed at a sheet exiting side the first erasing unit **201**. The sheet guide **31** guides the sheet S entering the first erasing unit with a sheet guide **33**. The sheet guide **33** opposes the sheet guide **31** and is fixed to the erasing apparatus **10**. The sheet guide **32** guides the sheet S exiting the first erasing unit **201** with a sheet guide **34**. The sheet guide **34** opposes the sheet guide **32** and is fixed to the erasing apparatus **10**. The sheet guides **32** and **34** operate as guides when the sheet S is carried into the second erasing unit **202**.

The first press roller **301** and the second press roller **302** are cylindrical rotating rollers which are respectively in contact with the first heat roller **213** and the second heat roller **214** in a longitudinal direction and respectively rotate around the rotating shafts **303** and **304**. The first press roller **301** and the second press roller **302**, for example, are formed by adhering a tube having a releasing property on a surface of an elastic body such as silicone sponge and the like. The sheet S is interposed between the first heat roller **213** and the first press roller **301** and between the second heat roller **214** and the second press roller **302** and is conveyed while being pressurized and heated by respectively urging the rotating shafts **303** and **304** towards the first heat roller **213** and the second heat roller **214**.

A pressure (pinch pressure) which urges the first press roller **301** towards the first heat roller **213** is indicated as F**1** in the first erasing unit **201**. A pressure (pinch pressure) which urges the second press roller **302** towards the second heat roller **214** is indicated as F**2** in the second erasing unit **202**. A ratio of the pinch pressure F**1** and the pinch pressure F**2** is, for example, 3:2.

For example, the rotating shaft **303** is pulled to the first heat roller **213** by a spring in order to cause the pinch pressure F**1**. In addition, for example, the rotating shaft **304** is pulled to the second heat roller **214** by a spring in order to cause the pinch pressure F**2**.

Next, description will be given with regard to the erasing processing on the sheet S by the first erasing unit **201** and the second erasing unit **202**. The sheet S is guided by the sheet guides **31** and **33** along the second conveyance path **142** and then is conveyed into the heating device **20**. The sheet S is conveyed in the direction of the arrow A at a preset rate by the press roller **301** of the first erasing unit **201** and the press roller **302** of the second erasing unit **202** rotating in an opposite direction to each other.

The first press roller **301** is urged towards the first heat roller **213** and is brought into contact with the first heat roller **213** with the pinch pressure F**1** in the first erasing unit **201** upstream of the conveyance path with respect to the second erasing unit **202**. A nip area is formed at a contact region (chain line X**01**) of the first press roller **301** and the first heat roller **213**, where heat is transferred to the sheet S. A sheet surface is heated while the sheet passes through the nip area X**01**, and then the image formed on one surface of the sheet S is erased.

If the image is formed on the sheet S with a erasable color agent, the color agent is decolorized when it reaches a predetermined temperature. The first heat roller **213** is uniformly heated by the cylindrical halogen heater **241** and is maintained at an erasable temperature. The temperature of the first heat roller **213** is detected by a thermistor (not illustrated) and is maintained at an appropriate temperature based on the detected temperature.

After the sheet S is ejected from the first erasing unit **201**, the sheet S is guided by the sheet guides **32** and **34** and is conveyed into the second erasing unit **202**. Top and bottom relation of the second press roller **302** and the second heat

roller **214** is inverted from the first erasing unit **201**, and the second press roller **302** is urged towards the second heat roller **214** and brought into contact with the second heat roller with the pinch pressure F**2** in the second erasing unit **202** disposed downstream of the conveyance path with respect to the first erasing unit **201**.

A nip area is formed in a contact region (chain line X**02**) of the second press roller **302** and the second heat roller **214**, where heat is transferred to the sheet S. A sheet surface is heated while the sheet S passes through the nip area X**02**, and the image formed on the other surface of the sheet S is erased. The sheet S of which images on both surfaces are erased is ejected along the sheet guide **34**, and is conveyed towards the third conveyance path **143**.

The configurations of the first erasing unit **201** and the second erasing unit **202** are substantially the same. However, since the erasing units are flipped upside down and respective rollers are disposed in series state, one surface of the sheet S is erased by the first erasing unit **201** and the other surface of the sheet S is erased by the second erasing unit **202**. Therefore, it is possible to effectively erase both sides of the sheet S.

In addition, though details will be described later, the heating device **20** of the present embodiment is configured to be divisible into two units with respect to a conveying path of the sheet as a border. When the heating device **20** is built into the erasing apparatus **10**, the first press roller **301** and the second heat roller **214** are included in an inside unit U**1** positioned inside. In addition, the first heat roller **213** and the second press roller **302** are included in an outside unit U**2** positioned outside.

As illustrated in FIG. **3** and FIG. **4**, opening and closing levers **21** are provided on both end portions of the inside unit U**1** of the heating device **20** such that an operator can manually open and close the heating device **20**. An elongated rod-shaped operating portion **21***a* is formed on one end of the opening and closing lever **21** so that the operator can apply a force by grabbing the operating portion **21***a*, and a hook-shaped hook portion **21***b* which is engaged with an eccentric shaft **22** is formed on the other end of the opening and closing lever. When the operating portion **21***a* of the opening and closing lever **21** illustrated in FIG. **4** is pushed down in a direction of an arrow D, the engagement of the eccentric shaft **22** with the hook portion **21***b* is released. Then, the outside unit U**2** of the heating device **20** rotates around a rotating shaft **23** with the self weight and is separated from the inside unit U**1**. As a result, as illustrated in FIG. **5**, the first heat roller **213** and the second heat roller **214** are opened and a jammed sheet can be taken out.

Next, description will be given with regard to a nip width adjustment structure in the above-described heating device **20**. As illustrated in FIG. **6**, when the hook portion **21***b* of the opening and closing lever **21** is engaged with the eccentric shaft **22**, the heating device **20** is in a closed state. In addition, as illustrated in FIG. **7**, a torsional spring **25** which elastically deforms depending on a force applied to the operating portion **21***a* is wound around a rotating shaft **24** of the opening and closing lever **21**. One end of the torsional spring **25** is connected to a frame of the inside unit U**1** and the other end of the torsional spring is connected to the hook portion **21***b* of the opening and closing lever **21**. If the heating device **20** is opened, the engagement of the eccentric shaft **22** and the hook portion **21***b* is released by the operator pushing the operating portion **21***a* from this state to rotate the operating portion clockwise.

If the operating portion **21***a* rotates counterclockwise from the engaged state illustrated in FIG. **7**, the state is brought into the engaged state illustrated in FIG. **8**. Since the hook portion **21***b* of the opening and closing lever **21** is more firmly engaged with the eccentric shaft **22** in the engaged state of FIG. **8** compared to the engaged state of FIG. **7**, the outside unit U**2** is lowered in the engaged state of FIG. **8**. As a result, a nip width in the first erasing unit **201** and the second erasing unit **202** increases.

On the other hand, if the operating portion **21***a* is rotated clockwise from the engaged state illustrated in FIG. **7**, the state is brought into the engaged state illustrated in FIG. **9**. Since the hook portion **21***b* of the opening and closing lever **21** is less firmly engaged with the eccentric shaft **22** in the engaged state of FIG. **9** compared to the engaged state of the FIG. **7**, the outside unit U**2** is lifted in the engaged state of FIG. **9**. As a result, the nip width in the first erasing unit **201** and the second erasing unit **202** decreases.

Here, the opening and closing lever **21** is fixed in the following steps of (1) to (4).

(1) The eccentric shaft **22** is positioned in an appropriate position.

(2) After the eccentric shaft **22** is positioned, the eccentric shaft is fixed by a fixing screw **22***a* in its center. Specifically, a groove (not illustrated) in which a flathead screw driver or the like can be inserted is formed on the eccentric shaft **22** in advance, the eccentric shaft **22** can be positioned in a desired position by the operator fixing the fixing screw **22***a* in the groove.

(3) After the eccentric shaft **22** is fixed by the fixing screw **22***a*, the position of the eccentric shaft **22** is fixed.

(4) Since the fixed eccentric shaft **22** does not rotate, the engagement of the hook portion **21***b* with the eccentric shaft **22** is also fixed.

Therefore, in the heating device **20** according to the present embodiment, it is possible to adjust a fixing position of the outside unit U**2** including the second press roller **302** by operating the opening and closing lever **21** which is placed on both left and right ends of the heating device **21**. That is, it is possible to adjust the nip width of the second erasing unit **202** by adjusting a pressure of the second press roller **302** independently on both the left and right ends. In addition, since the opening and closing lever **21** and the eccentric shaft **22** are disposed on the outside of a heat source cover covering an end portion of the second heat roller **214**, it is possible to simply adjust the nip width from the outside of the heating device without removing the heat source cover. The nip width of the second press roller contained in the outside heat source (second erasing unit **202**) has a great impact on occurrence of wrinkles. However, it is possible to suppress the occurrence of wrinkles by adjusting the nip width as described above.

Second Embodiment

Hereinafter, description will be given with regard to a heating device **20** according to a second embodiment. Since reference numerals in common with the reference numerals in the first embodiment indicate the same subjects, the points which are different from the first embodiment will be described in detail.

As illustrated in FIG. **10**, the heating device **20** according to the second embodiment also includes a first nip width adjustment member **26** on each end portion of the second press roller in a rotating shaft direction. The first nip width adjustment member **26** adjusts a nip width between the second press roller **302** and the second heat roller **214**.

As illustrated in FIG. **10** and FIG. **11**, a plate **26***a* includes a first slit hole **26***b* to adjust a position of a pressure member rotating shaft **27** of a pressure member frame **28** holding an

end portion of the second press roller **302** and a second slit hole **26***c* to adjust a position of a fixing screw **261** for fixing the first nip width adjustment member **26** to a frame of the heating device **20** (outside unit U**2**). The plate **26***a* is a main component of the first nip width adjustment member **26**. In addition, the first nip width adjustment member **26** has an adjustment member rotating shaft **26***d* which rotatably fixes the plate **26***a* to the frame of the outside unit U**2**.

When a lower end of the pressure member frame **28** is pulled by a pressure spring **29** for a second heat source, the pressure member frame **28** is rotated around the rotating shaft **27**, and a pressure is applied to the second heat roller **214** by the second press roller **302**.

If it is desired to increase the pressure applied by the second press roller **302** compared to a state illustrated in FIG. **11**, the plate **26***a* is rotated clockwise (arrow H direction) around the adjustment member rotating shaft **26***d*. Since the rotating shaft **27** of the pressure member frame **28** slides along the first slit hole **26***b* and the second press roller **302** approaches the second heat roller **214**, the pressure applied by the second press roller **302** is increased and the nip width is increased.

Conversely, if it is desired to decrease the pressure applied by the second press roller **302** compared to a state illustrated in FIG. **12**, the plate **26***a* is rotated counterclockwise (arrow L direction) around the adjustment member rotating shaft **26***d*. Since the rotating shaft **27** of the pressure member frame **28** slides along the first slit hole **26***b* and the second press roller **302** is separated from the second heat roller **214**, the pressure applied by the second press roller **302** is decreased and the nip width is decreased. After completion of the adjustment, the position of the plate **26***a* is fixed as illustrated in FIG. **10** by passing the screw **261** through the fixing slit hole **26***c*.

Therefore, according to the heating device **20** according to the present embodiment, since the first nip width adjustment member **26** is provided on both left and right ends of the second press roller **302**, it is possible to optimize the nip width by independently adjusting the pressure applied by the second press roller **302** on both left and right ends without removing the pressure spring **29**.

Third Embodiment

Hereinafter, description will be given with regard to a heating device **20** according to a third embodiment.

The heating device **20** illustrated in FIG. **13** further includes a second nip width adjustment member **36** to adjust a nip width between the first press roller **301** and the first heat roller **213** on both end portions of the first press roller **301** in a rotating shaft direction.

As illustrated in FIG. **13** and FIG. **14**, a plate **36***a* includes a first slit hole **36***b* to adjust a position of a rotating shaft **37** of a pressure member frame **38** holding an end portion of the first press roller **301** and a second slit hole **36***c* to adjust an position of a fixing screw **361** for fixing the second nip width adjustment member **36** to a frame of the heating device **20** (inside unit U**1**). The plate **36***a* is a component of the second nip width adjustment member **36**. An adjustment member rotating shaft **36***d* rotatably fixes the plate **36***a* to the frame of the inside unit U**1**.

If it is desired to increase a pressure applied by the first press roller **301** compared to a state illustrated in FIG. **14**, the plate **36***a* is rotated clockwise (arrow H direction) around the adjustment member rotating shaft **36***d*. Since the rotating shaft **37** of the pressure member frame **38** slides along the first slit hole **36***b* and the first press roller **301** approaches the first heat roller **213**, the pressure applied by the first press roller **301** is increased and a nip width is increased.

Conversely, if it is desired to decrease the pressure applied by the first press roller **301**, the plate **36***a* is rotated counterclockwise (arrow L direction) around the adjustment member rotating shaft **36***d*. Since the rotating shaft **37** of the pressure member frame **38** slides along the first slit hole **36***b* and the first press roller **301** is separated from the first heat roller **213**, the pressure applied by the first press roller **301** is decreased and the nip width is decreased. After completion of the adjustment, the position of the plate **36***a* is fixed by the screw **361** being tightened in the fixing slit hole **36***c*.

In this manner, it is possible to independently adjust a nip width of the first heat source as well as the second heat source on both the left and right ends by providing the second nip width adjustment members **36** at the first heat source side.

Fourth Embodiment

In the above-described embodiments, the nip width is manually adjusted. In addition, a configuration with a mechanically-driven adjustment also conceivable. A gear train **26***e* is formed on one end of the first nip width adjustment member **26** of the heating device **20** illustrated in FIG. **15** and a gear **401** of a driving device **40** is engaged with the gear train **26***e*. A motor (not illustrated) which drives the gear **401** based on control signals input from outside is built into the driving device **40**. The gear **401** is driven by the motor, and the plate **26***a* is rotated around the adjustment member rotating shaft **26***d*.

If it is desired to increase a pressure applied by the second press roller **302**, the plate **26***a* is rotated clockwise around the adjustment member rotating shaft **26***d* by the driving device **40** driving the gear **401** to rotate counterclockwise. Conversely, if it is desired to decrease the pressure applied by the second press roller **302**, the plate **26***a* is rotated counterclockwise around the adjustment member rotating shaft **26***d* by the driving device **40** driving the gear **401** to rotate clockwise. In this manner, it is possible to mechanically adjust the nip width by driving the first nip width adjustment member **26** using the driving device **40**. The heating device **20** is incorporated into the erasing apparatus **10** in FIG. **1**, but it is possible to quickly adjust the nip width without removing the heating device **20**.

In addition, it is possible to apply the structure of the nip width adjustment in the above-described heating device **20** to a fixing device incorporated into an image forming apparatus that employs an electrophotographic process, such as a copying machine, a facsimile, and a printer. In general, a fixing device has a pair of rollers including a heat roller and a press roller, conveys one sheet into a nip formed between the pair of rollers, pressurizes a toner image onto the sheet while heating the toner image, and fixes the toner onto the sheet. Therefore, if the fixing device includes a heating device opening and closing mechanism between the heat roller and the press roller, it is possible to easily perform the adjustment of the nip width by applying a connection structure of the opening and closing lever **21** and the eccentric shaft **22**, which are described in the first embodiment, to the heating device opening and closing mechanism. In the same manner, it is possible to provide the nip width adjustment member **26** described in the second embodiment on the end portion of the press roller of the fixing device.

While certain embodiments have been described, these embodiments have been presented by way of example only, and are not intended to limit the scope of the inventions. Indeed, the novel embodiments described herein may be embodied in a variety of other forms; furthermore, various omissions, substitutions and changes in the form of the embodiments described herein may be made without depart-

ing from the spirit of the inventions. The accompanying claims and their equivalents are intended to cover such forms or modifications as would fall within the scope and spirit of the inventions.

What is claimed is:

1. A heating device, comprising:

a first heating roller configured to heat a first surface of a sheet;

a second heating roller configured to heat a second surface of the sheet, the second heating roller disposed downstream in a sheet conveying direction with respect to the first heating roller;

a first pressing roller configured to press the sheet against the first heating roller, the first pressing roller and the second heating roller forming a first unit;

a second pressing roller configured to press the sheet against the second heating roller, the second pressing roller and the first heating roller forming a second unit that is rotatable about a rotational axis relative to the first unit;

an eccentric shaft unit disposed on one of the first unit and the second unit and extending in a direction parallel to the rotational axis, a rotational position of an eccentric portion of the eccentric shaft unit being changeable; and

an engaging unit disposed on the other one of the first unit and the second unit, and configured to engage with the eccentric shaft, a position of the second unit relative to the first unit being adjusted when the rotational position of the eccentric portion of the eccentric shaft unit is changed.

2. The heating device according to claim **1**, wherein:

the eccentric shaft unit includes a first eccentric shaft disposed at a first end of the one of the first or second unit in the direction along the rotational axis and a second eccentric shaft disposed at a second end of the one of the first or second unit, and

the engaging unit includes a first engaging unit configured to engage with the first eccentric shaft and a second engaging unit configured to engage with the second eccentric shaft.

3. The heating device according to claim **1**, further comprising:

an urging unit configured to urge the second pressing roller towards the second heating roller; and

an adjusting unit configured to adjust a pressure with which the second pressing roller presses the sheet towards the second heating roller, depending on a position of the urging unit relative to the second unit.

4. The heating device according to claim **3**, further comprising:

a driving unit configured to change a position of the urging unit relative to the second unit.

5. The heating device according to claim **1**, further comprising:

an urging unit configured to urge the first pressing roller towards the first heating roller; and

an adjusting unit configured to set a pressure with which the first pressing roller presses the sheet towards the first heating roller, depending on a position of the urging unit relative to the first unit.

6. The heating device according to claim **5**, further comprising:

a driving unit configured to change a position of the urging unit relative to the first unit.

7. The heating device according to claim **1**, further comprising:

a handle with which a user can change the rotational position of the eccentric portion.

8. The heating device according to claim **1**, wherein the first and second units are each configured to fix a toner image on the sheet.

9. An erasing apparatus, comprising:

a sheet conveying unit configured to convey a sheet; and

an erasing unit configured to erase an image formed on the sheet, the erasing unit including:

a first heating roller configured to heat a first surface of a sheet,

a second heating roller configured to heat a second surface of the sheet, the second heating roller disposed downstream in a sheet conveying direction with respect to the first heating roller,

a first pressing roller configured to press the sheet against the first heating roller, the first pressing roller and the second heating roller forming a first unit, and

a second pressing roller configured to press the sheet against the second heating roller, the second pressing roller and the first heating roller forming a second unit positioned around a rotational axis and rotatable relative to the first unit;

an eccentric shaft unit disposed on one of the first unit and the second unit and extending in a direction parallel to the rotational axis, a rotational position of an eccentric portion of the eccentric shaft unit being changeable; and

an engaging unit disposed on the other one of the first unit and the second unit, and configured to engage with the eccentric shaft, a position of the second unit relative to the first unit being adjusted when the rotational position of the eccentric portion of the eccentric shaft unit is changed.

10. The erasing apparatus according to claim **9**, wherein:

the eccentric shaft unit includes a first eccentric shaft disposed at a first end of the one of the first or second unit in the direction along the rotational axis and a second eccentric shaft disposed at a second end of the one of the first or second unit in the direction, and

the engaging unit includes a first engaging unit configured to engage with the first eccentric shaft and a second engaging unit configured to engage with the second eccentric shaft.

11. The erasing apparatus according to claim **9**, wherein the erasing unit further includes,

an urging unit configured to urge the second pressing roller towards the second heating roller; and

an adjusting unit configured to adjust a pressure with which the second pressing roller presses the sheet towards the second heating roller, depending on a position of the urging unit relative to the second unit.

12. The erasing apparatus according to claim **11**, further comprising:

a driving unit configured to change a position of the urging unit relative to the second unit.

13. The erasing apparatus according to claim **9**, further comprising:

an urging unit configured to urge the first pressing roller towards the first heating roller; and

an adjusting unit configured to set a pressure with which the first pressing roller presses the sheet towards the first heating roller, depending on a position of the urging unit relative to the first unit.

14. The erasing apparatus according to claim **13**, further comprising:

a driving unit configured to change a position of the urging unit relative to the first unit.

15. The erasing apparatus according to claim **9**, further comprising:

a handle with which a user can change the rotational position of the eccentric portion.

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